N.A.C.A. BULLETIN

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EDITORIAL DEPARTMENT NOTE

Decentralization of accounting may turn out not to be so much a method of organization of accounting functions as a part of every method made use of by companies with more than one operating location, to achieve the most efficient accounting setup. Our first article gives particulars of a study conducted by the author's company which resulted in a material modification of a somewhat centralized system of accounting so that plant management might have more useful control data promptly at hand.

T. H. PATTERSON, Chief Accountant, Armstrong Cork Co., Lancaster, Pa., is the author of the presentation. Mr. Patterson has been associated with the company throughout his business career and formerly held the post of Supervisor of Cost Accounting.

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Not only is sales management sometimes not accounting-minded; it is frequently not accounting-serviced. Our second article is built about three forms for providing sales personnel at all levels, and general management as well, with guidance as to status of orders, resulting sales, and the relative profitability of product groups.

The author is NORMAN A. COAN, a member of the Planning and Procedures Staff, Marathon Corp., Menasha, Wis. Mr. Coan's business experience has included positions in the bakery, rubber, chemical, and metal container industries. Prior to his present connection he was Works Accountant with Wyandotte Chemical Co. and Staff Industrial Accountant with Continental Can Co.

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The break-even point, which is a matter of much concern currently as an indicator of some of the most serious problems of business, is not solely a matter for the higher councils of general and accounting management. Our third article relates the altitude of the break-even point to the budgetary control of operations for which lower levels of supervision are responsible and outlines a control approach, one feature of which is to place a number of useful budget-derived reports in the hands of general foremen.

The author is NICHOLAS ST. PETER, Resident Controller, Clark Township Plant, Hyatt Bearings Division, General Motors Corp. Mr. St. Peter has been with Hyatt Bearings since 1928 and was Assistant Controller from 1934 until his appointment in 1942 to his present post in which he has conducted the installation of cost, general accounting, timekeeping and payroll, and other procedures.

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Lack of trained personnel to cope with the present responsibilities and opportunities of the industrial accountant is frequently mentioned. Earlier in the year a description of a two-week training program for new accounting employees was presented in the *Bulletin*. Our last article in the current issue gives the details of another program with similar objectives. This program envisions a full year's combined classroom and on-the-job training for selected college graduates recruited in the months preceding commencement.

ROBERT A. MORGAN, Manager, Office Methods and Procedures Division, Caterpillar Tractor Co., Peoria, Ill., is the author of the presentation and is in charge of the program described, which is being instituted by his company. Mr. Morgan has been connected with the company or a subsidiary since 1944.

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JUNE 1, 1948

A PROGRAM OF LIMITED DECENTRALIZATION OF ACCOUNTING FUNCTIONS

by T. H. PATTERSON,
Chief Accountant, Armstrong Cork Co.,
Lancaster, Pa.

MANY firms which have in recent years moved toward decentralization of their manufacturing operations because of sound economic reasons, nevertheless continue to direct their sales, administration, and accounting functions from a centralized home or main office. Is this evidence that these functions cannot be performed efficiently except on a centralized basis or is there more functional decentralization present than meets the eye? The more probable interpretation would be that main office functions likewise have been subject to change and that those remaining have demonstrated their effectiveness as centralized rather than decentralized functions. The important thing is that whenever there are significant changes in physical facilities they should be accompanied by a thorough review of organization and procedures, and changes made wherever necessary to provide the best utilization of line and staff services. This study will be confined to the accounting aspect of such an examination.

Extent of Decentralization a Matter for Study

In general, the advantages of performing a maximum of accounting functions at a centralized point are found in accessibility of data for consolidation of company operating and financial reports, economies through use of modern office machines and specialized training, maintenance of relatively simple accounting relations with vendors and customers, and uniformity of procedures affecting company relations with state or Federal governments and public auditors. On the other hand, the most important advantages of decentralization of accounting are to be found in the increased effective use of costs and control information. There is no inherent advantage to extending decentralized accounting, with the consequent disadvantages to the staff functions which are centralized, beyond the point to which it must go to give plant management adequate and timely control information.

In order to determine the degree to which the effectiveness of certain accounting tools might be increased if they were developed

and maintained at the factories rather than at Lancaster, an integrated plan for the study of this and associated problems was set up in the Armstrong Cork Company and work begun on the project early in 1945. The motivating force was to give better service to plant management and the investigation was concerned primarily with cost accounting and cost control problems.

The basic accounting principles and company practices were to be adhered to, but a reasonable diversity of methods was to be permitted which would recognize valid local or personal exceptions. All procedures were to be examined without prejudice and recommendations made to the controller to discontinue, simplify, or continue them on the same basis, keeping in mind the correlation needed between plant and general office records. Finally, adequate records were to be kept of the investigation which would show what was done, date effective, and savings or extra costs.

Organization of Accounting at Start of Study

Since the decentralization of accounting we were seeking was relative rather than absolute, a brief summary of the company organization as it was at the beginning of the study would be helpful. The company had thirteen plants at various points in the country (since increased to seventeen plants), the products of which were disposed of through five major sales divisions. All of the plants sold to at least two sales divisions and a few of them sold to all five. All shipments made to customers through sales divisions and interplant were made at standard factory costs, and the results of company operations were summarized by commodity groups under the five sales divisions at the general office.

The plant controllers submitted material and labor variances by commodities and the proration of these variances to sales divisions. The computation of manufacturing expense variances and the application of commercial and selling expenses were performed in the general office. The requirements of corporate accounting and profit and loss accounting are the same today as they were in 1945 and no change has been made in the type of information furnished in respect to commodity profit and loss reports although the plants now supply more of the required information. The accounting functions in the plants were under the responsibility of the respective plant controllers who reported to the plant management on a line basis but were responsible to the controller on a functional basis. Each plant was and is staffed with the necessary technical

assistance such as laboratory, engineering, personnel management, etc., to provide adequate on-the-spot services for the plant.

Centralized Functions in Existing Setup

The controller's general office organization included a general office cost department which was responsible for recording the cost of purchases and determining the purchase variance on the raw materials received at each plant, for the summarization of cost information emanating from each plant in a form usable for commodity profit and loss accounting, for summarizing company inventories twice a year and revaluating at "lifo" or the lower of cost or market, for computing the standard manufacturing expense rates each year which would be used in determining inventory values and standard costs in the factories, and for the computation and publication of divisional commodity profit and loss reports.

The property accounting section in the main office was responsible for maintaining records of fixed assets recording the depreciation and distribution of the same and the preparation of the journal entries each month charging the proper amount of depreciation to operations. The sales analysis section, located in the Lancaster main office, prepared through use of tabulating equipment all data in respect to quantities of sales, dollars of sales, commodities, branches from which the order originated, salesman securing the order, and all other related information in respect to sales statistics. The payroll department received from all the plants (with the exception noted later) the daily tabulating cards for each worker showing the amount of money earned and the accounting distribution thereof. These totals were summarized by pay periods and the net pay calculated and checks prepared and sent back to the factories for distribution on payday. Each month the accounting distribution of the payroll was prepared by the tabulating section in conjunction with the payroll section and the payroll run made for the general books, with a copy to the respective plants. The accounts payable section at Lancaster was responsible for approving for payment all vendors' bills and keeping on record the vouchers pertaining to those payments.

In addition, the staff functions of budgeting, auditing, and economic cost planning, as well as accounting and research were maintained at Lancaster. Other centralized staff functions not under the controller were likewise maintained at Lancaster and still are. Such departments as credit, traffic, general purchasing, accounts

receivable, billing, and the offices of the production managers and sales managers were all centralized as were the secretary's office and the treasurer's office.

Decentralization as Result of Study

The following is a summary of our conclusions in respect to the minimum functions to be set up as the plant controllers' responsibility but controlled by appropriate accounts in the general office ledgers. In some of the plants, the circumstances were such that further duties and responsibilities were transferred to the plant controller. The functions transferred to all plants were:

1. Payment of freight bills and complete approval of vendors' invoices.
2. Recording costs of purchases and preparation of purchase profit and loss reports.
3. Computation of gross pay earned by individuals and the accounting distribution of gross pay.
4. Accounting for withdrawals from mechanical supplies storeroom.
5. Computation at plant of standard factory cost of sales and transfers to company plants or branch warehouses.
6. Computation of factory expense budget allowances, a comparison of budgeted and actual expenses, and preparation of preliminary factory operating reports.
7. Building of the standard expense rates for estimating purposes and for inventory valuation under the guidance of the general office cost section.

Further accounting decentralization was set up for five of the company's factories to include the payment of all bills, the preparation and issuance of payroll checks for hourly employees, the maintenance of property accounting records, and the maintenance of general ledgers for control accounts of factory operation. In some instances, the preparation of billings to customers was also decentralized. The five plants referred to were either at great distance from the home office or had special problems in purchasing which could not be satisfactorily handled from the general office. All these moves stopped short of complete decentralization of accounting but were made at points where maximum savings in costs would be realized.

Accounting Functions Remaining at Home Office

In addition to established functions which have not been particularized, we kept in Lancaster general office the accounting responsibility for and work of:

1. Customer billings (except as noted)
2. Accounts receivable
3. Accounts payable (except freight and petty cash)
4. Property accounting
5. Sales analysis

During our investigation of the decentralization of accounting problem, it was our responsibility to follow through on installations to make certain that they worked smoothly. The detailed assistance given the plants in this connection was very helpful to them and, at the same time, provided a clearing point for troubles arising at either the factory end or the general office end of the proceedings. Some comments on the operation of each of the functions decentralized may be of interest.

Payment of Freight and Approval of Vendors' Invoices at Plants

It was considered desirable to have the vendors' invoices go directly to each plant. They had been partially approved at the plants before the program started, but complete approval was not possible because the plants were not processing or paying freight bills. To approve completely vendors' invoices in some cases, it is requisite to know whether the freight terms have been adhered to or not. It was therefore necessary to set up arrangements for payment of freight at the plants. This was done by increasing the plant imprest cash account to a sufficient extent to cover the substantial amounts of freights paid on incoming and outgoing shipments.

At this particular point, the traffic department at Lancaster became interested in the proposed change because of the advantage seen in reviewing freight bills before payments were made. Any adjustments of freight bills are much easier to effect prior to payment than they are afterward since the correction afterward involves a refund and hence a preparation of a claim. This matter was worked out satisfactorily in respect of plants within overnight mailing distance of the home office by having the carriers mail the freight bills to the traffic department at Lancaster first. For plants at greater distance, it was necessary to pay the freight bills first and have them examined at Lancaster for rate corrections later.

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Determining Purchasing Profit and Loss

With the payment of freight and approval of vendors' invoices set up at the plant, it was possible to go on to the accumulation of actual costs of raw materials purchased, the summarization of these costs, comparisons with standards, and the computation of the purchasing profit and loss report each month. Part of the approval procedure for vendors' invoices at the plant includes the calculation of the net amount of the bill and the application of the accounting code. The purchase cost of raw materials is posted to card records as the bills are approved, prior to mailing to Lancaster for payment. The control of these postings is maintained at the plants and verified against tabulated runs prepared at the general office for corporate accounting purposes. A copy of each plant's tabulation of materials purchased is mailed to the plant immediately after the run is made. The "cut off" point each month is noted by each plant on the invoices sent to Lancaster for payment.

The installation of the purchase profit and loss at each plant was a "natural" because all pertinent data in respect to the receipt of the material, the condition of the material, and its proper identification, were on hand at the plant and greatly facilitated the work of accumulating receipts and costs in the plant accounting department as compared with the details formerly involved when these records were reconciled at Lancaster. Through the decentralization of freight payments, approval of invoices, and preparation of the purchasing profit and loss at the plant, an appreciable decrease in correspondence resulted. Two copies of the receiving report and one copy of the purchase order were eliminated. Formerly the cost department and the accounts payable section at Lancaster received copies of receiving entries from the plants and matched these against the material paid for. The accounts payable section likewise received an extra copy of the purchase order.

Accumulation and Accounting Distribution of Gross Pay

The plant managers are most interested in the total wages paid daily or weekly for services performed in plant operations and much less concerned about who prepares the pay checks. The general office equipment is the most efficient payroll equipment we have and since the preparation of the pay check, the maintenance of earnings records, tax withholding, and miscellaneous records required could be done most economically at Lancaster, the responsibilities were divided on that basis. Weekly clock ring cards were

substituted at the plants for daily clock cards, and the accounting distribution was made from the original work reports at the factory. A tabulating card was designed to accommodate the accumulated pay for each person, the earnings were posted daily, and daily controls were maintained by the plant payroll department between the total pay and total distribution to accounts. At the end of each pay period, these cards are sent to Lancaster for punching in gross wages and the preparation of the pay checks. Each month a summary is made of the month's distribution of pay and mailed to Lancaster to be included in the company accounting details. The plant controller must reconcile payroll accrued and paid accounts.

Many uses are made of the prompt payroll distribution data now available at the plants, which were not possible when the distribution was prepared at Lancaster. The chief advantage is better cost control. Also, substantial reduction in storage space requirements came about through the use of weekly clock cards in place of the daily cards. All payroll distribution in the plants is done manually except for one plant. Manual distribution compares favorably with tabulating distribution in efficiency since it is possible to distribute the pay of entire crews to common operations. In tabulating, we were distributing each man's pay separately to operations common to the whole crew, a step which took a lot of card punching. In the one plant at which we are using punched card tabulation for this purpose, we have what is practically a job order operation.

Withdrawals From Mechanical Stores

In all our plants the purchases of spare machine parts and items of common use, such as small hardware, waste, oil gloves, soaps, and the like are charged to the stores account and carried in inventory under the control of the storekeeper. Releases from stock are by requisition, coded to the proper account and operation. The distribution of such materials is now tabulated at each plant and the charges accumulated promptly to assist in the control of maintenance and sundry supply costs.

Running the Factory Cost of Sales

Cost of sales and transfers of material to other plants are now summarized by the plant controller and journalized each month. This gives the plant controller better control of the entries affecting his inventory accounts and has reduced the accounting effort as compared with the previous method of putting the standard cost

of each shipment on the shipping copy of the order. Much of the quantity summarization now required was already being done for inventory control purposes and about all that was added was the extension of these summaries at standard plus a distribution to the proper sales division—or factory if an interplant transfer,

To operate this function properly from the plant, it is necessary to have a close tie-in with the billing department at Lancaster to be certain that the cost of sales for the few invoices overlapping at the end of the month is journalized in the proper period. The billing department will notify each plant controller, after billings have been completed for the month, of any shipments made that were not billed and the plant controller will adjust his cost of sales entry.

Factory Expense Budget and Preliminary Operating Report

The factory managers are supplied each year with a detail of the year's expense budget as it applies to each particular plant. This detail contains fixed amounts per month for some sources of expense plus the variable allowance factors of other sources on a unit basis. These budgets have, of course, been built and accepted by the plant management prior to their publication and the copy mentioned is sent for follow-up and comparison with the budget reports showing performance which are issued from the general office at Lancaster. The reports are prepared on tabulating equipment and it is therefore necessary to punch cards for the budget allowances and to summarize actual expenditures by the budget classifications of expense.

Prior to the decentralization program, the plant controllers submitted activity factors to the Lancaster general office each month, from which allowances were calculated and cards punched. The report prepared by assembling actual expenses against budgeted expenses was sent back to the plant about the fifteenth working day of each month. It was in detail in so far as operations and amounts of money spent were concerned, but contained very little detail concerning the items for which expenditures were made.

We moved the preparation of budget allowances each month to the plant controllers. Instead of sending activity factors into Lancaster general office, the plant controllers send in the dollar allowances for the factory expense budgets for the month and are thus able to record for the benefit of the plant managers the budget allowance totals before the report is mailed to Lancaster. The plant controllers then set up records to accumulate the actual

charges against expense during each month, a large part of which are summarized from the distribution of payrolls and of stores. The payment of money to vendors for items chargeable to expense could be summarized by the plant controllers as the bills proceed through the invoice approval section at the plant, but it was found more expedient to get a summary run by about the fourth working day of the month from the general office tabulating section.

Our normal closing schedule is geared to the ninth working day of the month. It proved possible for the plant controllers to pull together a budget report at the plant on the tenth working day, about a five working day gain over the former procedure. The fact that the plant controller had a part in the accumulation of these expenses has helped him very much in the presentation of the comparison of actual and budgeted expenses. The presentation was improved in another direction by the fact that the plant controller sat down in conference with the plant manager and went over the items of budget variance with him. This method of presentation has been a great deal more effective than the former written report submitted from the Lancaster general office.

The preliminary operating report referred to stems from the factory records in the possession of the plant controller and is a summarization of factory variances from standards, divided as to direct labor, material utilization, scrap, expense over or under the budget, and volume variance. This does not give the plant manager a profit and loss picture inasmuch as sales do not enter into the comparison, but it does give him a report of his complete performance against standards for the month and period to date.

Standard Manufacturing Expense Rates

Each year standard manufacturing expense rates are developed for each plant, using the plant budget as a basis of expense totals and tying the expense rates in with a predetermined factory volume. There has always been a fair amount of coordination between the plants and the general office in the computation of these rates and it was customary to review with the plant controller the rates developed in the general office before using them. This procedure has been changed to a certain extent.

Now the plant controller is furnished with the volume that is to be used for the setting up of the rates and is responsible for the development of the rates, themselves, the distribution of the service operations, etc. He does get assistance where needed from the

general office cost department, but the prime responsibility for building these rates is his and it aids him considerably in discussing standard expense costs with the plant managers or the sales department. It likewise makes for a more realistic distribution of service operations in the plants, since the individual plant controller has intimate knowledge of the activities of his plant.

Further Decentralization or Modification Possible

It goes without saying, of course, that the decentralization program is not static and it is altogether likely that further changes will be made, either toward a greater degree of decentralization or perhaps the modification of decentralization that now exists. The experience that we have with the operations as they are now set up will be the determining factor. As it looks at the moment, none of the functions decentralized will be brought back to the general office unless lack of control develops at the plants. There is no question but that information prepared on the spot is superior to that prepared at a distance for the purpose of accounting control of costs. It is believed that the transfer of the enumerated functions to the plant controllers has corrected the principal deficiencies in the previous centralized accounting in respect to services to plant management. Reports are more timely, realistic, and generally more useful when prepared at the plant for plant operations.

Lower Direct Costs of Transferred Functions

Our experience with the direct cost of the work decentralized has been good in comparison with the previous costs of performing the same functions. Part of this is due to the fact that the plants had been doing portions of the particular jobs, work duplicated to an appreciable extent in the general office. A portion of the time savings was secured by simplifying the work. Our records show that a reduction in effort amounting to 18,000 man hours per year has been accomplished on the jobs decentralized. A partial offset to this saving in the performance of the jobs involved arises from increased travel expenses of the company's internal auditors, a natural result of the program. However, the potential savings in plant operating costs through better cost control are large. The plant controllers are in a much better position now to give real service to company management and to use their ingenuity and knowledge to full advantage.

THREE TOOLS FOR SALES MANAGEMENT

by NORMAN A. COAN,

Planning and Procedures Staff, Marathon Corp., Menasha, Wis.

IN MANY organizations the sales manager is offered less by way of factual guidance than any other executive. The more complex and diversified the products of the enterprise, the more true this can be. Often the sales manager must look to some sixth sense, supplemented by optimism, to keep in touch with his immediate current and near future sales and sales profit position. However, the object of all control reports and devices, as distinguished from analytical, statistical, or purely financial accounting statements, is to put the reins of the business into the hands of the executive. One way to test the worth of a control or operating tool for management is to see if it can stand the "golf or work" test. The executive should be able to come to his office, scan the report, and from it determine whether to go golfing or buckle down to work. If the indicated action is work, then the report should also show where the work is needed and how much is required.

As applied to sales management, there are three reports by which the receipt and accumulation of orders, their transformation into sales, and knowledge of profit trends dependent on type of sales, can be kept well in hand. These are:

1. Bookings and Backlog Report (Exhibit 1)
2. Daily Billing Report (Exhibit 2)
3. Product Sales and Profit Trend Data Sheet (Exhibit 3)

A Hypothetical Case

Before giving further particulars of the use of these three tools, it will help to conjure up a hypothetical enterprise somewhat similar to the one for which they were originally shaped. This nonexistent company operates under the following conditions:

1. Products are sold to ten or more industry lines such as drugs, cosmetics, bakeries, frozen foods, meat packers, etc. There is also a line of household resale items.
2. There are literally thousands of individual products (counting sizes, styles, designs, and different basic materials) and a large portion of them are of the special or

Bookings and Backlog Report

Region: Company Total. As of January 15—1948. Date issued, January 16—1948. Major Group: Drug and Cosmetics Section: Drugs

Product	Unit	New Bookings (Units) This Week	This Mo. to Date	This Yr. to Date	Monthly Budget This Quarter	Net Scheduled Backlog (Dollars) January	February	March	April	All Beyond	Monthly Budget Next Quarter
Printed Cartons											
#1 of 300 products.....	M 100 Sq"	500	4,000		$36,000	$38,000	$30,000	$18,000	$5,000	.....	$40,000
#2 of 300 products.....	M 100 Sq"	900	1,800		20,000	18,000	30,000	5,000	5,000	.....	30,000
#3 of 300 products.....	M 100 Sq"	50	800		10,000	5,000	15,000	40,000	1,000	$7,000	15,000
#4 of 300 products.....	M 100 Sq"	4,000	15,000		134,000	150,000	100,000	80,000	50,000	30,000	170,000
Subtotal		5,450	21,600		200,000	211,000	175,000	143,000	61,000	37,000	255,000
Plain Overwraps											
#5 of 300 products.....	M#	70	300		60,000	30,000	70,000	20,000	10,000	2,000	40,000
#6 of 300 products.....	M#	40	300		50,000	50,000	50,000	70,000	20,000	10,000	30,000
#7 of 300 products.....	M#	90	180		30,000	10,000	40,000	5,000	.....	.....	40,000
Subtotal		200	780		140,000	90,000	160,000	95,000	30,000	12,000	110,000
Printed Overwraps											
#8 of 300 products.....	M#	30	100		25,000	40,000	15,000	5,000	.....	2,000	50,000
#9 of 300 products.....	M#	70	200		30,000	15,000	15,000	10,000	20,000	5,000	50,000
#10 of 300 products.....	M#	100	500		105,000	100,000	80,000	70,000	30,000	40,000	100,000
Subtotal		200	800		160,000	155,000	110,000	85,000	50,000	47,000	200,000
Laminated Foils											
#11 of 300 products.....	M#	30	100		40,000	60,000	20,000	40,000	40,000	10,000	30,000
#12 of 300 products.....	M#	30	50		20,000	10,000	5,000	10,000	5,000	.....	15,000
#13 of 300 products.....	M#	150	400		100,000	120,000	140,000	60,000	20,000	5,000	80,000
#14 of 300 products.....	M#	20	125		50,000	40,000	30,000	40,000	10,000	.....	40,000
#15 of 300 products.....	M#	60	300		90,000	100,000	80,000	70,000	20,000	30,000	85,000
Subtotal		290	975		300,000	330,000	275,000	220,000	95,000	45,000	250,000
Section total					$800,000	$786,000	$720,000	$543,000	$236,000	$141,000	$815,000

(Reported Only on Month End Report)

Exhibit 1

made-to-order type. However, experience has led to classifying all these products into 300 product groups dealt with separately in budgeting, sales-production coordination, materials allocation, and bulk reporting totals. For each of these 300 products groups a fairly representative common denominater reporting unit has been developed, such as 100 square inches, 1,000 feet, 1,000 pounds, equivalent quart, etc.

3. The sales organization consists of about 200 representatives working out of about ten regional offices. The company distributes nationally, manufactures in several plants, and has such matters as zone prices, quantity lot prices, etc., to deal with.
4. The company operates on a standard cost system and, due to tremendous product detail, utilizes mechanical tabulating equipment.

The three report tools described constitute a method of putting sales control data into the hands of the sales executives. Each performs a separate mission, though Exhibits 1 and 2 are used together to provide leverage to control certain operating conditions. Exhibit 3 is both a steady long-term standby tool for regular review and also a timely aid for special quick decisions.

DAILY BILLING REPORT

Number of shipping days in month.	22	Date shipped	1/15/48
Percentage of working days represented by each day.....	4.54%	Date billed	1/16/48
Section	Drugs	Billing days to date.....	11

	Net Sales Dollars			Per cent of month's budget to date
		Actual Billings		
Item	Month's budget	Today	Month to date	
Printed cartons.....	$200,000	$ 5,000	$ 60,000	(30.0)
Plain overwraps.....	140,000	8,000	70,000	50.0
Printed overwraps.....	160,000	10,000	88,000	55.0
Laminated foils.....	300,000	15,000	180,000	60.0
Section total	$800,000	$38,000	$398,000	(49.8)
BUDGET TO DATE.			$400,000	50.0%
Actual billings same date last month			$390,000	

EXHIBIT 2

Bookings and Backlog Report

The bookings and backlog report is issued weekly by product groups at company, region, and individual territory levels and, prepared separately for product lines, it goes to the respective sales promotion managers. Condensed into totals for each product line, the report reaches the sales manager, who also receives an interpretative analysis of the detail from the marketing control department. A copy is sent to the production planning department. An inspection of Exhibit 1 will show that the information given includes product designation, unit physical quantities of net bookings for the current week, month to date, and (for the final report for the month) year to date, and dollar figures for (1) monthly sales budget for the present and coming quarter and (2) scheduled backlog by shipping dates for four months including the current one, with a column for any additional backlog. The monthly sales budget columns relating to the two quarters are so placed that they will adjoin the backlog columns to which they relate. A double vertical line is drawn between the months at which the quarter breaks. It may be well to specify that the figures shown in the exhibit, whether net bookings or net scheduled backlog are *after cancellations*. The report is prepared by the sales service section of the sales division which receives, schedules, and enters all orders and works in close relationship with sales personnel, production planning staff, and customers.

Some may think array of data excessive. However, due to the many types of products, the many industry lines, and the nature of the products, the sales division really has two distinct jobs to perform. Not only must it *sell* the products, it must sell them in a *schedule matched with plant capacity*. Actually the sales division is selling machine hours and not products. Since the products are predominately tailor-made at all sales levels, the measure of performance must be sales versus a pattern, not just sales. By means of these reports, the entire sales division is kept advised of what holes can and should be filled 30, 60, and 90 days ahead. With sales budgets set near to (or at least with a known relation to) productive capacity, this report is an attempt to production plan by selling at right time intervals ahead of production.

The report is an important tool to sales management. It is one of the principal reins in its hands at all levels. It tells *in advance* how the business is *coming in* and on the same report *how busi-*

ness is scheduled to go out, and when it is in order to go golfing and when it is necessary to start digging.. The use of this report in connection with Exhibit 2 will be covered later in the article.

Daily Billing Report

This is a much simpler report and is issued only at company level. It is prepared by the accounting department and distributed to the sales manager, marketing control department, sales promotion managers (their own product lines only), budget director, and production planning department. It is issued daily by subtotals of product groups rather than by each of the 300 groups. These subtotals correspond to those indicated in Exhibit 1. The final column of the body of the form is the significant one, for it reports which product groups are progressing at budget velocity and which are ahead or behind budget velocity. This is accomplished by reporting the percentage of budget billed to date in red if below the percentage that should have been obtained and in black if equal to or better than budget velocity. The daily billing report simply shows how last month's forward planning is crystallizing as actual sales. However, this is important for two reasons. The first is psychological in that all minor and top executives, knowing that daily progress is reported, are apt to be more thorough.

Joint Use of Reports

The second reason relates to the use of the weekly bookings and backlog report in conjunction with the daily billing report by top sales management to follow the performance of the other phases of the company's operations in regard to fulfilling sales plans. Though it is certainly not the sales manager's responsibility to police the production, traffic, and accounting departments' performance as well as his sales divisions, it nevertheless is highly desirable for him to be aware how his sales plans are progressing from day to day in terms of all operations involved.

For instance, scheduled January shipments of printed cartons, per Exhibit 1, amount to $211,000 or above budgeted sales of $200,000 for this group of products as shown on both reports. However, Exhibit 2 shows also that with the month half gone, actual billings run to only $60,000 or 30 per cent of the budget figure. If the latter is to be met, shipments for the rest of the month will have to proceed at nearly two and one-half times the present rate. Knowing that the budget quantity is close to plant capacity

PRODUCT SALES & PROFIT TREND DATA FOR SALES BUDGETING

Group: Food Section: Meat Product Subtotal: Laminated Product: One of 300

			Sales			Gross Profit				Marginal Balance		
Yr.	Qtr.	Quantity	Dollars	Price	% Total Company	Amount	Per Unit	% Of Sales	% Total Company	Amount	Per Unit	% Of Sales
1	1	63,000	$521,500	$8.27	8.0	$212,800	$3.38	40.8	11.3	$272,600	4.32	52.3
9	2	49,400	406,200	8.22	5.6	163,900	3.32	40.3	7.7	201,000	4.07	49.5
4	3	60,200	491,400	8.17	6.5	197,400	3.28	40.2	9.0	254,600	4.23	51.8
4	4	56,100	460,500	8.21	5.7	182,700	3.26	39.7	8.0	226,700	4.04	49.2
	Yr.	228,700	1,879,600	8.22	6.4	756,800	3.31	40.3	8.9	954,900	4.18	50.8
			(Data for 1945 and 1946 have been omitted from exhibit)									
1	1	69,200	635,900	9.19	6.0	187,400	2.71	27.1	6.8	261,100	3.77	41.1
9	2	87,200	858,600	9.85	7.4	239,100	2.74	27.8	7.6	321,100	3.68	37.4
4	3	102,700	1,119,300	10.90	9.8	359,600	3.50	32.1	12.3	460,700	4.49	41.2
7	4	75,400	804,300	10.67	6.6	229,500	3.05	28.5	7.3	306,500	4.07	38.1
	Yr.	334,500	3,418,100	10.22	7.5	1,015,600	3.04	29.7	8.5	1,349,400	4.04	39.5
1	1	35,900	387,400	10.80	2.8	112,800	3.14	29.1	3.7	153,600	4.28	39.7
9	2											
4	3											
8	4											
	Yr.											

EXHIBIT 3

to produce, the sales manager is perfectly in order to demand explanation. Of course it could be all right. Perhaps all shipments are scheduled for the last part of the month but this is a bulky product and the storage facilities are limited so, if Order Service actually scheduled shipments this way, they were not planning too well. Or perhaps Traffic is behind—a car shortage. Maybe Accounting is having trouble with billings.

The second product subtotal, plain overwraps, offers another instance. Here a different situation exists. The backlog reported for January shipment is $90,000, only 64.3 per cent of the monthly budget of $140,000. On this item, the daily billing report states that $70,000 has already been shipped. This does not ring true for, if reported data is correct, the plant has only $20,000 yet to ship. This is not much over one-quarter of what it shipped the first half of the month. This could be, of course, but since the sales manager has heard no rumblings of a planned shutdown of this portion of production facilities nor requests to okay a stocking plan, there still is room for question. As in the first case, he investigates and is informed that February orders (note Exhibit 1 backlog for February is $160,000) are being pulled ahead and shipped in January. This is as it should be; the order service department is doing a good job to fill a *current hole* in the production and shipping schedule. However, there should have been a follow-through to correct the backlog report to reflect this.

Product Sales and Profit Trend Data Sheet

The third tool of sales management, which rounds out the group described in this article, is not necessarily used for control of day-to-day, week-to-week, or month-to-month sales operations. However, the form in which it is embodied is used as a constant reference by the sales manager, particularly during the processes of budget setting and profit planning, and as a constant thought-provoking device in matters of selective selling by products or of allocation of production capacity to lines, or with respect to pricing of products or lines. Exhibit 3 illustrating the form does not reflect data for the products shown on Exhibits 1 and 2. Rather, it shows the representative actual performance of an old line product group in our imaginary company. It consists of a multi-year record with quarterly detail.

It must be kept in mind that the data, though it covers "one of 300 products," actually does not apply to *one product*. It is one

group of products and, as explained before, the data reflects many influences such as product mix, quantity lot purchases, zone prices, style and size, geographical distribution, decoration, etc.

Bearing in mind that comparisons among periods run from top to bottom in each column, it may be helpful to pass "once over lightly" the information afforded by this form for the product group in question, on the basis of the hypothetical figures given:

Unit quantity sales—Increasing from 1944 through 1947 but markedly off first quarter 1948. This is partly expected from known industry trends but not expected to be so severe. Investigation now in process.

Net sales dollars—Increase of about 80 per cent from 1944 through 1947. Higher than the approximate 48 per cent increase in units for same period. First quarter 1948 down with units.

Unit prices—Rather steady through price-controlled years with reflection of proper increases in line with recent price rises. First quarter 1948 price up as expected. Part of investigation is to determine effect of price increase on volume decrease. Data at hand so far indicates volume drop not due to price reaction but to a more basic industry reaction.

Importance of product group to company, saleswise—In 1944 was 6.4 per cent of total sales. In 1947 was 7.5 per cent. Thus product group expanded at greater rate than total company sales. (Marketing research has shown that the company's proportion of total industry potential has increased slightly, but increase is generally due to over-all industry growth not replacing of competitor's products). First quarter drop for 1948 in the product group a serious one from this standpoint. Product loss was over 50 per cent of total company sales position on this group. Answer from investigation must determine over-all policy on what to do with lost capacity if it can not be continued on this set of products.

Gross profit—Increased approximately $258,000, 1947 over 1944, about 34 per cent. Since sales increased about 80 per cent (see sales columns), profit per cent per sales dollar must be sliding.

Gross profit per unit—Decreased 27 cents, 1947 from 1944.

Gross profit per cent of sales dollars—Decreased 10.6 per

cent, 1944 to 1947. Due chiefly to cost increases not reflected in sales price during controlled price period and even after price increases in 1947. Additional cost increases reacted to hold to lower level.

Importance of product to company profitwise—In this connection it may be pointed out that perhaps the only unique part of this form is the data in the "percentage of total company" columns. These are highly significant figures in evaluating the trend of a product group. The per cent of total company sales versus the per cent of total company profits very quickly pegs the importance of the product to the enterprise. What is more significant, the *change* in the relationship of these two figures quickly reveals the *trend direction* of relative importance of the product group to the company.

In 1944 this product group yielded 6.4 per cent of total sales and 8.9 per cent of total gross profit. Definitely a better than average profit product, a "big brother" product. Though both unit and dollar sales and profits have increased, the per cent of total sales in 1947 was 7.5 per cent while the per cent of total profits was 8.5 per cent. Still a better than average profit product group, *but not* as much above average profitwise as in 1944. If this trend continues it will soon be an average product group and unless the trend is arrested, the group will deteriorate to "bread and butter" status.

Marginal balance—Taking these three columns together, there is an interesting story here in regard to apparent fixed costs. (We are looking at this through sales eyes, not cost department eyes). In 1944 the difference between marginal balance per cent and gross profit per cent (50.8 minus 40.3) was 10.5 per cent. This per cent of sales dollars, amounting to $197,350, is thus the apparent assessment of fixed charges against this product group. In 1947 the difference (39.5 minus 29.7) is 9.8 per cent. Here the amount is some $335,000, the apparent fixed charges assessed against the product. It would seem that fixed charges have increased about 65 per cent.

The Meaning of the Story

With the data in front of him, it is most likely that thoughts such as these occur to the sales manager and are sooner or later translated into action:

1. Would an analysis of this product group's sales by regions and territories, even down to customers, reveal certain areas of the country that are considerably less profitable than others?
2. Can manufacturing engineering do anything to cut the variable cost of manufacture of this product and thus enhance the marginal balance and increase our profits?
3. Should we ask the accounting department to explain the sizable increase of fixed costs assessed to the product?
4. Is there anything wrong with our price setup on this product group whereby we might be losing profits due to wrong zoning prices, wrong quantity lot prices, wrong products, style, and size prices? Is an analysis of these conditions in order?
5. What are we as a company prepared to do with this product group if the trend to a "bread and butter" product continues? Continue at present velocity? Let it die out by itself? Discontinue it at once? Better check up on the entire make-up of our product line. How many products and what percentage of our total business reflects such a condition? Due to our rapid growth, are we turning into a different type of business in which we must look to large volume to secure the desired profit?
6. What has the product development department to say about this product group as it is—or about improvements?
7. Are there any other products in our present line which use the same raw materials and converting capacity as this product and show a more favorable profit trend?

The three tools for sales management exemplified by the forms described in this presentation are not a cure-all. Possibly they are not even the best of such tools that may be in existence. However, under the conditions of our hypothetical enterprise and in most real ones, there is a complex situation to face. It is impossible for any one executive, or in fact several executives, to keep in touch with all the details of such an enterprise. Each controls a multiplicity of activity by means of a set of reins leading to his hands from the centers of activity. The sales executive of our enterprise can control the activities for which he is responsible by these three tools.

FINDING AND CONTROLLING THE BREAK-EVEN POINT

by NICHOLAS ST. PETER,

Resident Comptroller, Clark Township Plant,
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Rahway, N. J.

THE break-even point is a good barometer of profit possibilities. For this reason, it is essential that we not only plan our break-even point on the basis of *expected* price levels, *expected* fixed costs, and *expected* variable costs, but that we also check current performance to determine what changes are taking place in any or all of these factors and the effect of such changes on our expected profit and expected return on investment. It is my purpose to describe a procedure for dealing with this problem.

Our perspective is conditioned by the physical volume we are expected to produce and ship during the ensuing calendar year. We call this the Index Volume and check it against our capacity to ascertain whether or not a third shift, sixth day overtime, daily overtime, or additional facilities may be necessary, all factors affecting our cost of doing business. If additional facilities are necessary we check on our invested capital also. This study also permits us to have available when required the manpower and facilities necessary for our scheduled production.

Flexible Budget Supplies Basic Data

As a basis on which to work we have a flexible manufacturing expense budget predicated on what we call Standard Volume and covering fixed and nonvariable expense, variable expense, and productive labor. We use this budget to develop a standard burden rate to compute burden unit costs, and productive labor and manufacturing expense for any level of manufacturing activity. We use it also as a measure against which current productive labor and manufacturing expense may be checked.

For budgeting purposes, we include in *fixed and nonvariable expense* the conventional fixed charges such as property insurance, property taxes, and depreciation on buildings and equipment. In addition we include the costs of a nucleus organization, fuel oil for heating, electricity for lighting and other necessary purposes, water, necessary maintenance, and development expense. Among *variable expenses*, apart from labor and materials, we recognize:

1. Supervision not provided for in the nonvariable budget
2. Setup men
3. Process inspectors
4. Final inspectors
5. Laborers
6. Timekeepers
7. Clerks
8. Inside and outside truck drivers
9. Crane operators
10. Supplies
11. Product tools
12. Commercial tools
13. Tool maintenance
14. Machine maintenance
15. Building maintenance
16. Power
17. Employee insurance and taxes
18. Cost of scrapped product
19. Cost of reworking defective product
20. Cost of downtime
21. Cost of miscellaneous items not otherwise classified

Predetermining Costs and Burden Rates

Each of these items of expense is expressed as a percentage of productive labor in setting up the budget. These rates are developed from our current year's experience after eliminating nonrecurring items and also providing for known unusual expenses we expect to sustain during the year. Productive labor is computed as an allowance for each unit of product. This allowance is generally the current actual, adjusted to remove any abnormalities.

At this point we have available the data from which we can predetermine our productive labor cost and manufacturing expense for both our standard volume and index volume. For productive labor we merely multiply the allowance per unit by the respective physical volumes. Inasmuch as our variable rates are expressed in detail as percentages of productive labor, we predetermine variable expense by multiplying allowed productive labor by these rates. Fixed and nonvariable expense is the aggregated dollar allowance, by account. We divide standard volume productive labor into total fixed and nonvariable costs and add over-all variable rate per dollar of productive labor, giving us standard burden rate. This burden rate is used as a basis of allocating burden to units of product.

Commercial Expense and Product Engineering

Commercial expense is also burden. With us, it consists of administration, advertising, selling, shipping, and loading expenses. Estimates are prepared of administrative costs for the year using current costs as a guide and tempering them to reflect expected changes. An advertising program is prepared by our advertising manager showing contemplated expenditures for each kind of publicity: radio, magazines, trade papers, newspapers, etc. The sales department prepares an estimate of its expenses, using the current costs as a guide. Shipping and loading costs are pr

determined as a percentage of the sales dollar. We consider all of our commercial expenses, with the exception of shipping and loading, as nonvariable costs. Shipping and loading costs are considered variable.

There are two other types of expense in our business that we consider nonvariable. These are product engineering and special tools. Our product engineering department is charged with the responsibility of issuing product specifications to the manufacturing and inspection departments, designing new products, and servicing field representatives with technical data. An estimate is prepared of expected costs for the year. An estimate is also prepared by the development department of expected expenditures for special product tools. These are the initial sets of tools that are required to produce new products which we expect to add to our line during the new year.

Raw Material Standards

We have not yet mentioned raw materials. We have raw material standards for every component that we make. These tell us how much material must be used to produce each component part in our line. We also know from data supplied by our purchasing department approximately how much we are going to pay for this raw material. Knowing these two factors, it is a simple matter to determine our expected raw material costs per unit. We merely multiply the quantity required by the price we expect to pay. To compute the total expected raw material costs at both standard and index volume, we multiply each respective physical volume of each part by the expected unit raw material cost.

Profit and Loss Budget

We are now ready to prepare our profit and loss budget at both standard volume and index volume. The physical volumes of both standard and index are converted to dollars of sales on the basis of the current price level. Our cost of sales are determined by adding together the following costs, all of which have already been developed in our discussion thus far:

1. Raw material
2. Productive labor
3. Variable manufacturing expense
4. Fixed and nonvariable manufacturing expense
5. Product engineering
6. Special product tools

The sum of these costs deducted from our expected sales revenue gives us our gross profit. We then deduct from our gross profit commercial expenses which have been previously mentioned. The result is net operating profit before Federal income tax. As previously mentioned, a profit and loss budget as described is prepared for both standard volume and index volume.

Determining Break-even Sales

The basic structure is now complete. In order to ascertain our expected break-even point, it is necessary to determine two things: (1) our planned fixed costs and (2) our planned variable profit.

Planned fixed costs have already been developed in this discussion. They are:

1. Manufacturing fixed and nonvariable expenses which are a part of the manufacturing expense budget.
2. Fixed administration, fixed advertising, and fixed selling expenses which are a part of the commercial expense budget.
3. Fixed product engineering expense.
4. Fixed special tools expense.

The sum of these costs represents total planned fixed and nonvariable costs. If we add these costs to net operating profit before Federal income taxes the result will be variable profit. You would get the same result by deducting from expected sales revenue planned variable costs, as follows:

1. Raw material
2. Productive labor
3. Variable manufacturing expense
4. Shipping and loading expense

We now want to determine the percentage of planned variable profit to our total sales. This is computed by dividing total sales into planned variable profit. If we then divide the percentage of planned variable profit into our total planned fixed and nonvariable expense, the result will be our expected break-even sales.

Reviewing the Plan with Top Management

All of the component parts of our plan for the ensuing year have now been summarized in the profit and loss budget for both

standard and index volumes. Management now knows how much profit it can expect to earn if the price level is maintained and budgeted costs are not exceeded, at both standard and index volume. It knows, too, how much capital will be tied up in the business and the expected percentage of profit return on investment at both standard and index volume before and after Federal income tax. It knows our break-even sales volume on the basis of the budgeted price level and budgeted costs.

The line executives are now in a position to decide intelligently on their course of action if they are not satisfied with the goals indicated in our profit and loss budgets. They may decide, for example, to try to increase sales volume. In this event, a further study would be made to determine what additional facilities are required, what the effect on our fixed costs would be, how much the added fixed costs would increase our break-even sales, and whether or not our return on investment would be improved. Or they might decide that our break-even point is dangerously high in relation to sales possibilities and that we should revamp our organization to effect a reduction in nonvariable expenses which in turn will reduce our break-even point.

Reviewing the Plan with Other Levels of Supervision

Accordingly, after top management has approved our profit and loss budget, we take the time to review our over-all objectives with all levels of factory supervision. In these meetings, which are composed of small groups, we tell the supervisors what our standard and index physical volumes are by part number so that they can readily see what their production problem is going to be in the ensuing year. We explain to them what composes our fixed and nonvariable costs and what they amount to, what composes our variable costs and what they amount to per dollar of sales, what our variable profit is per dollar of sales, and how our break-even point is determined. We emphasize to them the part they must play in the achievement of the objectives and the effect on our variable profit and break-even point if their budgeted costs are exceeded. They are also told how the new manufacturing expense budget compares with the old, how they performed on an over-all basis against the old manufacturing expense budget, and how their current expenditures measure against the new budget allowables.

Immediately after these meetings are held, each general foreman

is given his own departmental budget in the plant manager's office in the presence of the plant manager, his division head, and a representative of the accounting department. At this time, the departmental budget is explained thoroughly to the general foreman so that there is no question about the basis of measurement of his performance and how it is determined. The plant management receives a copy of the over-all manufacturing expense budget and each departmental budget. Division heads receive a copy of each departmental budget under their jurisdiction.

Checking On Performance

On Tuesday of each week, a report of manufacturing expense performance of the preceding week is submitted to the plant manager and the general manager. This is a simple report, 8½" by 5", divided into two sections. The upper part is used to reflect manufacturing expense performance and the lower part productive labor performance. In the upper section on the left are shown in the first column our nine main expense accounts:

1. Indirect labor
2. Supplies
3. Tools
4. Power
5. Maintenance
6. Employees' insurance and taxes
7. Manufacturing losses
8. Fixed charges
9. Sundry

Going to the right, we have several columns. In the first column is shown the total actual expense for the week by account. The second column shows the fixed and nonvariable allowance by account and the third column shows the total variable expense for the week by account, which is the difference between column one and column two. In the fourth column is shown the variable expense allowance by account, determined by multiplying the variable rates by the amount of allowed productive labor for the week. In the fifth column is shown the budget gain or loss. The lower part of the report is not divided into columns. On the first line we indicate the amount actually spent for productive labor during the preceding week. The second line gives the amount allowed for productive labor for the production actually processed and in the third line the productive labor gain or loss.

Reports to General Foremen

At the close of the calendar month, each general foreman receives a similar budget report of his departmental performance. This report is issued about the tenth of each month. We also give

our general foremen two simple weekly reports of their productive labor performance.

One of these reports is a Report of Operators Whose Efficiencies are Below 100 Per Cent. In this report, we list each operator whose efficiency was below 100 per cent for the calendar week, indicating his clock number, name, date of hire, actual hours worked, standard hours earned, and lost hours. The other report is called Labor Effectiveness. This is a summary report showing total actual hours worked by all bonus operators, total standard hours earned, percentage of operating efficiency, actual number of hours required to rework rejected product, and percentage of labor effectiveness. The percentage of operating efficiency is obtained by dividing standard hours earned by the sum of actual hours worked. The percentage of labor effectiveness is computed by dividing the standard hours earned by the sum of the actual hours worked on bonus and the actual hours required to rework rejected product. The plant manager and division heads also receive copies of these reports.

Two additional reports to reflect the quality performance of the operators under their supervision are likewise given to the general foremen. One of these is submitted weekly and is called Rejection Report. The other is submitted monthly and is called Scrap Report. The rejection report indicates by class of product the total number of pieces produced during the week, the number of pieces scrapped and the percentage this bears to the total production, the number of pieces rejected which can be reworked and the percentage this bears to the total production. This is followed by a listing by causes of the number of pieces scrapped and the number of pieces rejected for rework. The scrap report indicates by class of product the total number of pieces scrapped by causes and the total cost value of this scrap. The plant manager and division heads receive copies of these reports as well.

Place of the Shop In Maintaining Break-even Point

If a general foreman has inefficient producers in his department, he can affect the break-even point of the business substantially because his variable costs for labor, supplies, tools, power, and maintenance will be too high for the volume of good product he is getting out. Therefore, we want our foremen to know who the inefficient producers are. These producers cause us to use more machine tool capacity than we should be using for the volume of

product. If this wasted machine capacity could be diverted to producing more goods, we might possibly increase our sales volume without adding to our invested capital and also without adversely affecting our break-even point.

The break-even point of any business is the result of three factors:

1. The price level
2. Total fixed and nonvariable costs
3. Variable costs

If the break-even point is disproportionately high as related to sales expectations and some correction is not made quickly, the result can be unprofitable operation and eventual financial failure. For this reason, it is extremely important that management establish the goals that it wants its organization to achieve. It is equally important that all levels of supervision be fully informed of these goals and how they are performing against them. If we as industrial accountants can accomplish these objectives, we will be making a substantial contribution to the financial success of our own individual companies because we will then be helping management to keep the ship of business on a safe course.

COMING ARTICLES

In the *N. A. C. A. Bulletin*, June 15, 1948

Payment of Employees by Payroll Draft Instead of in Cash

by Millard B. Thomas

A Procedure for Handling the Retail Receivables of an Oil Company

by A. P. Yung

Profile of an Accounting Executive

by Edward C. Karmgard

Accounting Control of the Operations of a Small Hospital

by Delbert J. Morrison

MEETING MANAGEMENT'S NEED FOR MEN TRAINED IN INDUSTRIAL ACCOUNTING

by ROBERT A. MORGAN,
Manager, Office Methods and Procedures Division,
Caterpillar Tractor Co., Peoria, Ill.

FOR MANY years Caterpillar Tractor Company has had shop apprentice courses through which new employees were trained to adapt the generally accepted theories of the particular type of work involved to specific company methods. Also, for many years the company has had an informal training program in order to develop accounting department employees. Up until fairly recently, when a young man with an academic background or practical experience in the field of accountancy applied for work with our company, he was interviewed by personnel division and accounting department employees. If he successfully met the standards of these interviewers and if an opening existed, he was given a job in one of the divisions of the accounting department, sometimes as a timekeeper on a night shift. If the applicant appeared to possess outstanding ability and academic background and no openings existed, he was often hired and put to work in the internal audit division which had been designated as an informal training ground and therefore a potential source of supply for men for other divisions of the accounting department.

When the company's growth was moderate and when well-trained employees were easier to find, this was acceptable to all concerned. However, the rapid expansion of the company and the drain on the accounting department by other departments of the company has created a demand for men with accounting training in excess of the supply made available in this way. This situation, coupled with the general employment situation, required that unusual steps be taken.

Recruiting Trainees

Accordingly the accounting training program which Caterpillar Tractor Company is beginning in the summer of 1948 came into being. It is believed that this training program will materially reduce the amount of time which is required for the new employee to become completely acquainted with the company's systems and methods. The decision to embark upon this program was made

after due consideration of the cost of training men without a productive return while they remain in training and after making sure that there would be a sufficient number of job opportunities within the organization to which the men might be assigned after completing training. The plan is directed to obtaining and training for the company men who have already received a college education. Inasmuch as it has always been the company's policy to promote from within when qualified people are available, it was first decided to survey present employees to determine how many were qualified. This was done through the medium of a bulletin board announcement. This announcement elicited applications from relatively few employees and even fewer proved to possess the necessary educational background.

Additional recruits were therefore sought in the colleges and universities offering a sufficiently extensive accounting curriculum. To present our program to the seniors at the various schools we prepared a bulletin entitled "College Graduate Accounting Training Program" and distributed it to the placement directors at the schools where interviews were to be conducted. The brochure and the interviews stressed the approach that seniors being graduated in 1948 have a wide choice of a future in industry because consumers' wants still exceed the supply in most lines. It was pointed out that men with specialized training are in demand, but that eventually the supply of both men and material will equal calls upon them. It was urged that for these reasons graduates carefully consider the fields of endeavor open to them.

Before presenting the particulars of the program, it may be well to set forth the assumptions on which it is planned to proceed. Although we believe that the universities and colleges generally offer excellent curricula in the theory and principles of accounting and related subjects, we know that the modern business organizations present complex individual problems which are not and should not be a part of the basic college or university training. To achieve success the graduate must master these individual problems and he must learn in most cases a system of accounts and related refinements adapted to the particular enterprise. This requires supplemental training. Whether corporations should give formal training to provide this missing element or permit their employees to learn through absorption and association are questions on which there has been no unanimity of opinion. Cater-

pillar believes it is among the first to present a full year's training program on company time devoted primarily to accounting and related matters. By spending at least a year in concentrated training, a new employee can become familiar with many of the intricacies of accounting for the manufacture and sale of varied products distributed throughout the world.

Entrance Requirements

Applicants who desire consideration for employment by the company in its college graduate accounting training program are subject to the following requirements:

Education—The applicant should be a graduate (or a graduating senior) of a recognized college or university. He should have majored in accountancy and should have taken related work in economics, business organization and operation, business law, etc.

Grades—The applicant's grades are taken into consideration. The applicant should show particular proficiency in accounting and related subjects. By this we mean he should have attained at least a "B" average, particularly in accounting.

Personality—The applicant must be able to get along with people and yet find an absorbing interest in figures.

Age—Each applicant should be at least 21 but not more than 30 years of age.

Marital Status—Both married and single applicants are invited.

Military Service—Both veterans and nonveterans are invited to apply. All other conditions being equal, preference will be given to veterans.

Physical Condition—Each applicant selected for employment will be required to pass a physical examination given by company doctors. Minor physical deficiencies will not handicap an applicant's chance for employment.

Examinations—Each applicant will be given an entrance examination on accounting subjects. It is not a difficult examination and is given solely to permit us to judge whether the applicant has absorbed and retained enough basic accounting theory to enable him to grasp the classroom work presented as a part of the course.

Attitude and Aptitude Tests

In order to appraise more accurately applicants for enrollment in the college graduate accounting training program, the personnel consultant of our industrial relations department was asked to prepare attitude and aptitude tests which would measure the following desirable characteristics:

1. Constructive curiosity or auditing instinct (a critical attitude in which nothing is taken for granted).
2. Constructive and independent thinking subject, however, to a desire to cooperate and to abide by all reasonable rules, regulations, and established procedures.
3. Mental alertness.
4. Thoroughness.
5. Use of English (ability to express ideas in a concise and understandable manner) both in writing and orally.
6. Willingness to stand the gaff of exacting work and a temperament suitable to cope with detail work without loss of interest.
7. Tactfulness and courtesy.
8. Cost consciousness.

Standards by which the applicants are to be judged were developed by statistics and profiles obtained from results of attitude and aptitude tests, identical with those to be used in the appraisal of candidates, given to accounting department supervisory employees. Seven tests which are listed below comprised the examination:

1. Minnesota Reading Examinations for College Students.
2. Cleeton Vocational Interest Inventory.
3. Wonderlic Personnel Test.
4. Science Research Associates Test of Practical Judgment.
5. Guilford's Inventory of Factors STDCR.
6. Guilford-Martin's Inventory of Factors GAMIN.
7. Allport and Vernon—A Study of Values.

Although the accounting department supervisors were requested to sign their names to the tests, the results were held in strict confidence by the personnel consultant. Because there was

a considerable degree of interest expressed by the supervisors in the tests, arrangements were made through which each supervisor could discuss his own personal scores with the consultant. Department supervision was not informed of the individual scores.

How the Training Program Is Handled

Caterpillar's college graduate accounting training program contemplates a combination of formal classroom sessions and less formal on-the-job training. Applicants who are hired as trainees become members of the training division of the accounting department. As members of this division they will be responsible to the accounting instructor as their supervisor. Formal non-accounting classroom work is to be presented by instructors from the training department. Accounting subjects are presented by the accounting department instructor or by supervisors of various divisions of the accounting department.

"On-the-job" training will be given by the supervisors in each of the divisions of the accounting department. Insofar as is possible, each of the training "stations" will be a regular job in the particular division. In selecting the jobs for training stations, attempts have been made to find places where the trainee may obtain a perspective on the operations as well as an acquaintance with the volume of detailed work which must be completed accurately. Through classroom sessions, conferences with the instructor, and discussion meetings, the trainees will be able to relate their work to the over-all accounting work. Textbooks will be supplied to the trainees by the company. The company also maintains a comprehensive business library from which the trainee may borrow books or current periodicals for related reading. A reasonable amount of outside study is encouraged.

At the end of each series of classroom sessions and at the completion of work at each training station, the trainee is expected to prepare a report of what he has learned. While a part of the reason for these reports is to determine how the trainee is progressing, the main purpose of the reports is to encourage the trainee to express himself. Progress is difficult for the business man and accountant who cannot communicate his ideas both orally and in writing. Throughout his training period the trainee will be expected to suggest new methods or to criticize existing methods where potential savings or better internal control appear possible.

Each employee in the accounting training program will attend classroom sessions about four hours a week. This portion of the training will include the subjects shown below with the total hours assigned to each:

Subject	*Total Hours*
Machine tool types and uses	12
Company products	40
"Economics in one lesson" (Hazlett)	12
Effective speaking	10
Working with others	10
General operations of the accounting department	8
Details of the operations of the following:	
Factory accounting division	20
Cost division	12
Tabulating division	12
Payroll division	8
General accounting	20
Internal auditing division	20
Office methods and procedures	8
	192

All trainees will attend classroom sessions together, but the group will be divided for "on-the-job" training. This division is required so that each trainee may be assigned to a training station where actual work experience may be obtained. Listed below are the training stations to which trainees are to be assigned and the number of weeks which will be spent at each:

Training Station	*Number of Weeks*
Factory accounting	8
Cost accounting	8
General accounting	8
Internal auditing	8
Office methods and procedures	8
Tabulating	6
Payroll	4
	50
Vacation	2
Total	52

Graduates who are selected for employment are informed that they may elect to begin work on any Monday starting June 14, 1948, through July 26, 1948. So that classroom work may be presented to all trainees simultaneously, the first classroom session is scheduled for the week of August 16, 1948, after the return to work from the company's scheduled plant-wide vacation.

The graduating seniors who are considered for the course are told that the company's expansion program offers many excep-

tional opportunities for advancement to qualified personnel. With excellent academic background and one year's concentrated training in Caterpillar methods, each applicant selected should be able to demonstrate that he merits promotion and pay increases. The company has always endeavored to promote from within the organization and this practice is expected to be continued. In carrying out the program, the company reserves the right to dismiss any trainee if it becomes apparent that his and the company's time and money will be wasted by continuation in the course. It is also made clear to the prospective trainee that Caterpillar cannot make any direct commitments to the individuals who are selected for accounting training. It is felt that too many forces beyond the company's control would make the assumption of such an obligation unreasonable and unfair to both employer and employee.

Compensation During Training

In determining a fair wage to offer college graduates entering the accounting training program, the company has taken into consideration the rates paid by others to accounting graduates and to graduates who have specialized in other fields. The trainee will be granted one rate increase during his period of training providing his progress has been satisfactory. If the trainee's progress does not warrant an increase, an attempt will be made to place him elsewhere in the company. If this action is not mutually desirable, the suggestion will be made to the trainee that his best interests would be served if he found other work.

Upon satisfactory completion of training, each trainee will be offered a regular job paying no less than the rate he is then earning. Insofar as is possible the trainee will be given an opportunity to select the division of the accounting department in which he wishes to work. In addition to accounting department jobs which we are reasonably sure will be available to trainees, other departments of the company have indicated an interest in the program and are looking forward to acquiring some of the men who will have received the accounting training offered by the course. These departments include sales, treasury, purchasing, merchandising, and parts.

Interviewing

After the placement directors of colleges had had an opportunity to review our booklet, we wrote each of them suggesting dates

when we might come to their campus and interview candidates for the training program. We suggested to the placement directors that each interviewee complete one of the company's application blanks (bound into the booklet) before the interview. During our interviews at the schools, we told the seniors something about the company, advised them of our wage structure, and attempted to find out whether the student had chosen between public accounting and industrial accounting, whether he was married, if he had any preference as to climate or other geographical location, his ultimate objective, and any other pertinent facts. During the interview periods we neither accepted nor rejected applications. Each applicant was told that upon our return to Peoria we would review his application carefully and would write him our decision within a period of one week to ten days.

Because there were usually two interviewers who talked to each man, it was possible to compare notes after our return to our office. We then wrote each applicant that we were interested in his application or that we were not interested. To the former group, we extended an invitation to visit the company at our expense to obtain a better idea about the company and about its location, with working and living conditions in mind. This resulted in second interviews which proved valuable in checking the original judgment on the applicant. During the second interview each candidate was required to take the attitude and aptitude tests previously mentioned to assure us that no square pegs were to be driven into round holes. When the second interview was completed, the pplicant was again told that he might expect a letter from us lvising him of our further decision.

Making the Final Decision

After we have had an opportunity to look at an applicant, both at his school and at our office, we must make the final decision as to whether he is to be offered a job in the training program. Factors which affect this decision are the applicant's grades while in school, his previous work experience, the results of the attitude and aptitude tests given him during his second interview, general personality, his age, and the home town from which he and/or his wife come. Each of these factors is of equal importance and all are interdependent. Our training department has reliable statistics tending to prove that a man born and raised in one of the coastal states does not prefer the midwestern climate.

Within a week or ten days after the second interview, each man is advised that he is not being considered or that we would like him to accept a job. As the program goes on it is anticipated that after 1950 the type of men interviewed, their ages, standards, mental status, and general outlook will change materially and some of the tests and techniques now used will no longer be appropriate. This may be the period in which the greatest number of GI's complete their education.

General

In the actual training, considerable time is to be spent during the year in instructing the trainee in other than accounting matters. Too often accountants are not cognizant of the material things which surround them and we feel that early in the training program is the period to present information about our company's products and the machine tools which make those products possible. Our training department, which has presented both apprentice courses and supervisors' courses on these matters, has been asked to present this material to the accounting trainee. Supervisors of the accounting training program and the supervisors of the various functional divisions of the accounting department will present the material relating to the operation of the accounting department.

While in training, the trainee will be rotated among various work stations throughout the accounting department. The jobs will not be the most responsible in any particular section, but an effort has been made to avoid placing the trainee on the most routine jobs. The jobs selected are those in which the trainee will get an opportunity to do detailed work and yet see the over-all application. An example is the training station in the vendors' invoices section of our general accounting division. In this position, the trainee will be required to handle two or three hundred invoices a day, comparing them with copies of purchase orders and entering accounting distribution for the subsequent use of the tabulating division.

When the trainee has successfully completed the one-year program, he will be placed in the accounting department or in some other department of the company where accounting training is desirable and where he will be on his own in competition with other employees.

N.A.C.A. BULLETIN

Section Three

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RESEARCH SERIES NO. 13

STANDARD COSTS FOR COSTING INVENTORIES

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VOL. XXIX, NO. 19 JUNE 1, 1948

FOREWORD

This report, which is the third in a series dealing with standard costs, presents the results of a study of uses made of standard costs for costing inventories. Previously published reports in the series have been "A Reexamination of Standard Costs" (*N.A. C.A. Bulletin*, Feb. 1, 1948) and "Standards to Aid Control of Manufacturing Costs" (*N. A. C. A. Bulletin*, March 15, 1948). The use of standard costs for pricing and budgeting will be considered in another report to be published at a later date. Current practices described in this report are drawn from the same field study covering 72 companies using standard costs upon which other reports in the series have been based.

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Committee on Research.

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STANDARD COSTS FOR COSTING INVENTORIES

STANDARD costs are usually placed on the books to facilitate the process of accounting for costs, particularly if standard costs are used for costing inventories. While standard costs need not be entered on the books in order to use them for purposes of cost control, pricing, or budgeting, incorporation of standard costs into the accounts probably strengthens the effectiveness with which standards can be used for purposes other than bookkeeping economy.[1] In the field study it was found that only four of the 72 companies whose methods were studied did not have standard costs entered on their books.

Bookkeeping can be simplified, clerical expense reduced, and reports prepared more promptly in many cases through the use of standard costs. The usefulness of the reports to internal management can also be increased, although this subject is more closely related to the use of standards for cost control.[2]

Types of Cost Systems

As the complexity of manufacturing processes increases and the number of products made in a plant grows, the problems which arise in determining product unit costs become more difficult. Likewise, the ascertainment of costs of goods in finished and in-process inventories becomes more troublesome. The development of accounting techniques to meet these problems has followed two somewhat different approaches. These are:

1. To use a job order cost system in which the manufacturing costs applicable to each order are recorded on a sep-

[1] Specific advantages to be gained are:

a. Comparisons of actuals with standards, prior to entry in the accounts, are usually limited to details for foremen or executives at the departmental level. Summary cost statements up to and including the profit and loss statement can show comparisons with standards if standards are on the books and variances are collected in appropriate accounts. Thus the use of standards is extended upward to top executives.

b. The requirement that standard costs be tied in with the book cost controls promotes accuracy and causes both the accounting and operating departments to take them more seriously.

c. The clerical facilities of the accounting department are utilized to advantage in producing the control reports.

[2] For a full discussion see "Standards to Aid Control of Manufacturing Costs," Research Series No. 12, *N. A. C. A. Bulletin*, March 15, 1948.

arate job cost sheet. The accumulated costs on the order cost sheets thus give product costs by orders and, by summation, provide the cost of the inventory. Job order costing is employed when it is desired to know the actual cost of individual jobs and when separate accumulation of costs is not unduly expensive in relation to the value of the goods in the order.

2. To abandon the attempt to accumulate actual costs of individual products or orders and to substitute instead predetermined product unit costs for costing product and inventories. This approach has been found to be the only practical one in some industries where the diversity of products is very great and the individual order of relatively low value. In many other industries this use of predetermined costs is the most economical way to account for manufacturing costs. Savings of clerical expense result primarily from eliminating the need to carry many relatively small variations in actual costs through the work in process, finished goods, and cost of sales accounts. Transfers of production costs from department to department are then made at a standard cost which changes much less frequently than does actual cost. Fluctuations in actual cost need be accounted for only in total. Early cost systems of this type used estimated costs but today standard costs are commonly employed for the purpose.[3] This plan of accounting has the added advantage of bringing the accounting for costs into the concept of managerial control which is based upon the comparison of actual with previously planned results.

Companies which use standard costs in their accounts are not limited to those producing a standardized product for stock. In the field study it was found that of 65 of the 72 companies, 35 stated that they made principally a standardized product for stock, 25 stated that they made principally a product produced to the customer's order or specifications, and five companies stated that their

[3] For a discussion of the difference between estimated and standard costs, see "A Reexamination of Standard Costs," Research Series No. 11, *N. A. C. A. Bulletin*, Feb. 1, 1948, pp. 697-699.

production was about equally divided between stock and special order work.[4]

Accounting Procedure With Standard Costs

Extent of Application in Costing

Standard costs may be set and used for all elements of manufacturing cost or they may be applied in accounting for some elements of cost and not for others. Thus of the 68 companies which were interviewed and which use standard costs in bookkeeping, five do not enter standards in the books for some portions of their costs.[5] The remaining 63 companies use standards for all elements of cost and the remainder of the study will be limited to a consideration of these companies.

Costing Finished Goods and Sales

Most companies transfer completed product from work in process to finished goods and cost of sales accounts at standard cost. Hence entries in finished goods and cost of sales accounts are at standard costs. The same method is usually followed in costing finished parts which are put into stock for subsequent use in manufacturing. Where a single inventory account is in use, the inventory account is credited at standard and cost of sales charged for standard cost of goods sold.

This use of standard costs for costing finished goods and sales has several advantages, namely:

1. The standard cost of products completed and of products sold can be determined immediately without waiting for the actual cost to be calculated. This, in turn, helps to prepare monthly statements in a shorter time than if actual costs were used for the purpose.

[4] Most companies have some work in both the stock and special order categories. Where most work is for stock, there may be production of tools and machines for use in the company's own plant, production of samples and experimental models, or repair and construction jobs. Even though regular production is costed on a standard or actual process basis, a limited amount of job order costing is commonly done for special work.

[5] Of these 5 companies, 2 have only overhead standards on the books although one has complete material and labor standards which are used for control and pricing purposes and the other has material usage standards for cost control. The latter company was in the early stage of developing standard costs at the time of the interview and planned to make more extensive use of standard costs later on. Another company which was also just beginning to use standard costs had no material standards. Material price standards are not used by one company because its product is priced on the basis of material at market price. Still another company has material and labor standards, but uses actual overhead.

2. Where a great many different products are made it may be practically impossible to determine actual costs of each product. By using standard costs, the preparation of profit and loss statements by product lines is facilitated.
3. Some clerical saving may result from keeping finished goods stock records in quantities only. This practice eliminates the necessity for recording actual unit cost of each receipt and issue.

Costing Work in Process Inventories

Procedures which use standard cost for costing work in process inventories vary widely according to the nature of the industry and the accounting methods of the individual company. Work in process accounts are usually charged with materials at standard price and with labor at the standard rate. Material quantity and labor performance variances are determined at points in the manufacturing process which best facilitate cost control.[6] Entries to remove these variances to variance accounts are based upon summaries of material requisitions, time tickets, scrap reports, inspection reports, etc. Overhead is charged to work in process accounts at the standard rate, based upon the method of applying overhead used by the individual company.[7] Under this plan of applying standard costs the more important variances are transferred to variance accounts before the entry transferring completed goods from work in process to finished goods account is made. Hence the variance which appears when finished goods are cleared from work in process at unit standard cost is usually only a residual of variances not previously separated.

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[6] For a description of methods used, see "Standards to Aid Control of Manufacturing Costs," Research Series No. 12, *N. A. C. A. Bulletin*, March 15, 1948, pp. 907-910.

[7] In the field study it was found that overhead is usually applied to product on the basis of standard hours or standard dollars. Only a few companies use actual hours or actual dollars for the purpose. Standard hours are preferred to actual hours because the former are not greatly affected by extraneous factors and thus better measure production. As stated by the controller of one company:

> "Normal time required to manufacture is the proper medium for assigning overhead. Actual direct labor does not represent normal or actual production time because of different direct labor variances on different product lines. These direct labor variances represent, not productive time, but nonproductive time since they arose from waiting for materials, use of inefficient methods, etc. Little, if any, overhead is applicable to such labor losses and in reality such variances are themselves indirect costs or overhead."

Since the standard cost of a finished product unit is built up by following the sequence of the manufacturing process, it is relatively easy to determine the standard cost of goods at the stage of completion reached at the end of a period. Most of the companies studied take a physical inventory of work in process at the closing date while others rely upon perpetual inventory records. In the latter case production counts are made at the completion of each manufacturing process and inventory records are kept which show at any time the quantity of work in process and the stage of completion reached.[8] The extent to which each of the above methods is used was not determined in the study.

Costing Raw Materials Inventories

In the field study it was found that approximately three-fourths of the companies price materials at the standard price when the materials are received. These companies carry their raw materials on the books at standard cost, although in some cases the price variance applicable to unused or unsold material is regarded as an inventory valuation account. Some companies stated that they obtained important savings in clerical expense by eliminating actual prices from stock cards and requisitions. Other companies stated that they found such savings to be insignificant.[9] Pricing material at standard on receipt of the material may have an advantage in that the causes of price variances are more easily determined if recorded at the time they occur.[10] A few companies keep raw material stock records at actual cost because they wish to have actual costs of materials on a detailed basis; other companies obtain approximate actual cost by use of the ratio between actual and standard cost.

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[8] For an example of this plan, see T. R. Elsman, "Work in Process Inventory Control," *N. A. C. A. Bulletin*, Sept. 1, 1946, pp. 14-19.

[9] Usually stock ledgers show quantities only, thereby avoiding the necessity for making numerous extensions in terms of dollar cost. However, one company stated that through use of mechanical equipment both quantities and standard cost are recorded on stock cards and by thus eliminating the costing of quantities when a trial balance is taken, clerical expense is no greater than it would be if only quantities were recorded on the stock cards.

[10] Thus a manufacturer of electrical equipment reports that information as to the causes of price variances is useful when variances are written off, when price standards are revised, and when quotations are prepared for customers. When price variances are the result of a general change in commodity prices, revision of the standard prices and perhaps of year-end inventory valuation are usually indicated. When the price variances result from purchase in small quantities or from a higher-priced source in order to obtain immediate delivery, the variances are written off.

Variance Accounts

When the methods of accounting with standard cost described in the foregoing pages have been applied, the difference between actual costs and standard costs is found in the variance accounts. The number of variance accounts seems to be determined by two considerations:

1. The number and type of variances which are to appear in statements for management use. Most of the control statements are prepared from statistical summaries of original records which underlie the accounts. However, the principal groups of variances commonly appear in the statement of cost of goods manufactured and in the income statement which is prepared for use of internal management.
2. The need for separation of variances to facilitate disposal of the variance balances. Where the different variances are not treated uniformly at the end of the period it may be desirable to have them segregated in the accounts.

Ordinarily the number of variance accounts in the ledger is comparatively limited, for a detailed analysis of variances is not needed for inventory costing purposes.

Costing of Inventories and Disposal of Variances

In the determination of periodic income, the cost assigned to raw material, goods in process, and finished goods inventories is of prime importance. There exists a divergence of opinion as to whether or not standard costs are proper costs for this purpose. Whether inventories are costed at standard or at approximate actual by companies using standard costs appears to be determined largely by:

1. The type of standards employed.
2. The degree of success which the company has in keeping over-all actual costs in line with standards.
3. The concept held with regard to the kind of cost most suitable for costing inventories.

But whether or not standard costs are used in stating inventories in financial statements, they can be used advantageously to facilitate the determination of inventory amounts. When standard costs

are incorporated into the accounts, end-of-period inventories can be stated at standard or converted to actual by the method used in disposing of variances. If the final inventories are to be stated at standard the variances are treated as charges against the current period, while if actual cost is the basis selected the variances are divided between inventories and the cost of goods sold. While methods of making this apportionment differ, the effect is to include with the cost of inventories that portion of the variance which is applicable to the goods in inventory and thereby to arrive at the approximate actual cost of these goods.

In practice a company may treat different types of variances in different ways. Some may be written off in their entirety against the current period while others may be divided between inventories and cost of goods sold.

Price Standards

Standards employed for material price and labor rates represent three different types of a standard cost. These are:

1. Current standards
2. Normal standards
3. Fixed standards

The effect which the type of standard chosen has on the use of price standards for inventory costing is discussed below.

Since labor rate variances are separated from labor performance variances by only a few of the companies studied, disposal of labor rate variances is discussed with labor performance variances. When labor rate standards are current, the standards are generally kept very close to actual rates paid by revision of the standards when changes in rates are made. Hence labor rate variances are usually relatively unimportant.

Current Material Price Standards

Current standards are intended to reflect quite closely what the company actually expects to pay for materials.[11] Material price standards of the current type are set either by forecasting what the actual cost is expected to be during the period in which the stand-

[11] The field study indicated that most companies use current price standards. Thus in a group of 63 companies having material price standards on the books, the price standards used by 51 companies may be classified as current.

ard will be in effect or by taking for the standard the actual price prevailing at the date the standard is set. Current material price standards are most commonly reviewed and, if necessary, revised annually although some companies review and change price standards oftener.[12]

Development of Material Price Variances

The costing of materials in inventories is affected both by the point at which price variances are separated and by the disposal which is subsequently made of the variances. In separating the variances, three methods were found, viz.:[13]

1. Costing materials at standard price on receipt. Companies which follow this method carry all materials in inventory accounts at standard prices. When material price variances are written off currently, as most companies do, the variance is charged against income in the period in which the materials are purchased.
2. Costing materials at standard price when the materials are issued. Under this plan the raw material inventory is carried at actual cost, but work in process and finished

[12] Frequency with which material price standards are reviewed by companies using current price standards is summarized below.

	No. of Companies
Review standards annually	33
Review standards semiannually	2
Review standards quarterly	3
Review standards monthly	1
Standards under continuous review and may be changed at any time	5
Standards reviewed and changed when large variances arise or when it is considered desirable to revise	6
Standards reviewed for each production order	1
	51

[13] The following tabulation shows the frequency with which each of the three methods is used by 51 companies having current material price standards.

	No. of Companies
Materials costed at standard price on receipt	36
Materials costed at standard price on issue	12
Materials costed at standard price on completion of manufacturing process	3
	51

goods accounts contain materials at standard price. Price variances are taken into the profit and loss account in the period in which the materials are put into process unless the accumulated variance balance is divided between inventory and cost of goods sold at the end of the period. Companies which use this method wish to separate the material price variance by product lines and find this aim most readily accomplished by costing material at standard price when the material is put into process.

3. Costing materials at standard price when completed work is transferred to finished goods account. In this case only materials in the finished goods inventory are stated at standard cost on the books, all other materials in inventory being at actual cost. Material price variances are developed in the period in which the goods are completed.

Disposal of Variances from Current Material Price Standard

When material price standards are, or are intended to be, current standards, three-fourths of the companies interviewed charge off the variances in their entirety in the period in which they are developed while the remaining companies divide material price variances between inventories and cost of sales. In the former case some or all materials in the inventories shown on the balance sheet are at standard price; in the latter case all materials in inventories are costed at approximate actual price.

While the companies which divide price variances have price standards which are intended to be current, a few of them have during a period of extensive price changes experienced such large price variances that they considered it necessary to divide the variances between inventories and cost of sales, although they ordinarily treat price variances as period costs. However, most of the companies dividing the variances do so because they prefer actual costs of inventories even though in some cases price standards are revised very frequently and material price variances are negligible in amount. Two of these companies stated that in their cases top management was little interested in standard costs and hence statements prepared for these executives show actual costs and no variances.

Normal Price Standards

Normal price standards have been described by one writer as:

> ". . . costing rates which, with historical experience and good judgment as guides, have been predicated on a long-range plan. In this type of costing, the standard rates used for costing labor, material, and overhead are seldom revised. . . . Labor and material standard rates used for costing the labor and material elements of cost are not changed to reflect the inflationary and deflationary effects of prosperity and depression. In other words, the current material specifications and the current labor time standards extended at the normal standard rates are considered to be the normal cost for the labor and material elements of cost."[14]

Actual prices paid at a given time may deviate considerably from the normal standard prices because normal standards are not changed to reflect short period ups and downs in actual prices. However of the eight companies using normal price standards, six had revised their normal material price standards within the year at the time of the field study. These six companies cost inventories of materials at their normal standards and treat price variances as period costs. The remaining two companies having price standards set before 1947 stated that their material price variances were large because their price standards were out of date. For this reason, these variances were being divided between inventories and cost of sales to obtain approximate actual cost of materials in inventories.

Fixed Price Standards

Fixed price standards are used as an aid in accounting for costs and to measure price trends over a long period. However, when fixed standards are employed, inventories are stated at approximate actual cost rather than at standard cost. Only four of the companies covered in the field study have fixed price standards for material.

Companies which use raw materials fluctuating widely in price sometimes find it advantageous to employ fixed price standards instead of current or normal price standards because it is virtually impossible to keep a current standard up to date or to set a representative normal standard. For example, a manufacturer of storage batteries uses a fixed price standard for lead. Purchases of lead are charged to a materials inventory account at the standard price and price variances are carried to a variance account which

[14] T. R. Elsman, *N. A. C. A. Bulletin*, Dec. 15, 1944, p. 371.

is treated as an inventory valuation reserve. Lead used in production is accounted for at standard price in the work in process and finished goods accounts. At the end of each period an adjusting entry is made transferring from the material price variance account to the cost of sales account the amount of the price variance applicable to the quantity of lead in batteries sold during the period.[15] The objective of such an application of fixed standards has been stated as follows by one user of the method.

> "Although price variances are reported currently to management for information and control purposes, the primary use of material price standards is for ease in recording transactions and for valuation of inventories and cost of sales. Moreover, since market prices are available, it is not necessary to use standard material prices in computing costs for selling prices. The material price variance accounts, therefore, are used mainly in computing the amount of variance to be charged monthly against cost of sales . . . and for adjusting standard inventory values to actual on an over-all basis."[16]

The use of a standard price also avoids the necessity for keeping detailed records of prices of material in work in process and finished goods. It thus saves clerical expense and difficulties which arise in accounting for many changes in material prices.

Companies employing fixed price standards for one or more major materials commonly use current standards for other materials and for other elements of manufacturing cost. Only two companies were encountered in the field study which use fixed standards for all elements of cost. One of these two companies employs the basic standard cost plan of accounting.[17]

Material Quantity and Labor Variances

In an earlier study[18] it was pointed out that material quantity

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[15] See C. E. Carlson, "Standard Costs Under Decentralized Production," *N. A. C. A. Bulletin*, June 1, 1945, pp. 879-886; letter by H. W. Luenstroth in Our Open Forum, *N. A. C. A. Bulletin*, Sept. 15, 1945, pp. 89-90; John F. Mickelson, "Standard Costs Applied to the Manufacture of Silverware," *N. A. C. A. Bulletin*, Dec. 15, 1947, pp. 445-458.

[16] John F. Mickelson, *op. cit.*, p. 450.

[17] For a description of this plan, see Eric A. Camman, *Basic Standard Costs*, American Institute Publishing Co., 1932; or *Cost Accountants' Handbook*, Ronald Press Co., 1945, pp. 270-71 and pp. 355-387.

[18] "A Reexamination of Standard Costs," Research Series No. 11, *N. A. C. A. Bulletin*, Feb. 1, 1948, p. 704.

standards and labor performance standards may represent theoretical ideals, attainable good performance, or an average of unadjusted past performance. Almost all of the companies visited in the course of the field study use attainable good performance standards for material quantity and labor performance. In setting standards for these elements of cost, current control considerations are usually stressed more than the inventory costing questions which are involved. While no specific measure to determine the tightness of standards could be developed in the field study, the general impression gained was that net variance balances are usually relatively small under material quantity standards. On the other hand, net labor variance losses are common and sometimes substantial in amount.

That these standards are generally viewed as satisfactory for costing the material quantity and labor element in inventories can be seen from the following summary of practice derived from the field study. As stated previously, only a few companies separate labor rate variances from labor performance variances and hence the figures below refer to the total labor variance.

	No. of Companies	
	Material quantity variances	*Labor variances*
Variances treated as period costs; inventories charged with standard cost only	47	52
Variances divided between inventories and cost of sales; inventories at approximate actual cost	13	11
No standards for this element of cost; actual cost used	3	0
Number of companies reporting	63	63

Where the variances are divided between inventories and cost of sales, the reason for this practice can usually be ascribed either to the fact that standards deviate substantially from attainable performance[19] or to a managerial preference for actual cost.

[19] Most of these companies have standards which have not been revised for a number of years. One company is developing a new line of products and has not yet been able to set what it considers to be satisfactory material quantity standards; hence as a temporary measure it divides the material quantity variances and costs inventories at actual. This company's labor variances are very small and hence it charges off labor variances.

Overhead Cost Variances

The standard overhead rate is usually based upon a volume of production which is intended to provide for recovery of overhead costs over a period of years. Used for costing production, it avoids the disturbing effect of fluctuations in production volume which tend to increase unit costs in periods of low activity and to decrease unit costs in periods of high activity. Moreover, since the variable overhead costs are included in the overhead rate at the unit allowance budgeted, incurrence of variable overhead costs in excess of the amount budgeted for the quantity of product made does not increase the cost of goods produced because the excess cost is treated as a variance.

While there are three factors which can cause overhead variances, namely, production volume, production time, and spending, the field study showed that only the total overhead variance is developed on the books. Since none of the companies interviewed make a distinction between the different overhead variances in variance disposal, only the total over- or underabsorbed overhead balance is needed. Analysis of the overhead variance for cost control or other purposes is done off the books.

Overhead Variance Disposal

Practice in disposal of overhead variance by the 63 companies covered by the field study is summarized below.

	No. of Companies
Overhead variance treated as period cost	49
Overhead variance divided between inventory and cost of sales	10
Loss variances treated as period cost, gain variances divided between inventories and cost of sales.....	4
	63

With a few exceptions, companies having overhead standards which are up to date cost inventories at the standard overhead rate and write off variances. Most of these companies review their standard overhead rates once a year or whenever it is considered

necessary because of changes in conditions.[20] While overhead rates are reviewed at fairly short intervals, changes are not always made at each review. The following statement seems to be representative of the point of view held by a majority of the companies interviewed:

> "When new burden rates are set they are intended to remain fixed for as long a period as possible, say two to five years. However, changes in production schedules, improvements in manufacturing methods, shifts of production between factories, etc., frequently make it necessary to revise these burden rates more often."[21]

At the time of the field study it was found that all of the 49 companies treating variances as period costs and all but three of the companies using other disposal methods had revised their overhead standards in 1946 or 1947. A number of these companies commented to the effect that in the past the standard overhead rate had been revised only at intervals of several years, but that marked changes in volume and expense factors required revision shortly after the close of the war.

Companies which divide overhead variances between inventory and cost of sales or profit and loss do so because overhead standards are distinctly out of date, because activity substantially above normal has resulted in overabsorption of overhead with the consequence that inventories are stated in excess of actual cost, or because managerial policy in the company calls for actual costs in the financial statements. These companies generally follow the same practice in disposal of direct material and direct labor variances.

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[20] Frequency with which standard overhead rates are reviewed was reported as follows:

	No. of Companies
Annually	43
Semiannually	3
Quarterly	3
When considered necessary	14
	63

[21] John F. Mickelson, "Standard Costs Applied to the Manufacture of Silverware," *N. A. C. A. Bulletin*, Dec. 15, 1947, p. 448.

Position of Variances in the Profit and Loss Statement

Writers on standard costs have generally advocated showing variances as adjustments to profit in the profit and loss statements prepared for use of management. Two general patterns can be distinguished in statements which follow this plan. The first, which is used when standard selling prices are used, arranges the items in the statements as follows:[22]

Net Sales	$ xx
Budgeted Net Profit	xx
Sales Volume Gain or Loss	xx
Standard Profit on Current Sales	xx
Total Variances	xx
Net Profit Before Federal Taxes	xx
Analysis of Variances:	
Sales Price Variance	xx
Sales Mixture Variance	xx
Cost Variances (listed in detail)	xx
Total Variances	xx

The second pattern, which does not require standard selling prices, appears in the following form:[23]

Net Sales (actual)	$ xx
Standard Cost of Sales—Manufacturing	xx
Anticipated Gross Profit	xx
Cost of Sales—Commercial	xx
Anticipated Operating Profit	xx
Cost Variances (listed in detail)	xx
Net Profit Before Federal Taxes	xx

These forms differ principally in that the first presents an analysis of sales variances in addition to cost variances. In both, emphasis is placed upon the variances and the effect which these

[22] For illustration of this form of profit and loss statement, see *Cost Accountants' Handbook*. Ronald Press Co., 1945, pp. 62-65.

[23] See Clinton W. Bennett, "A Case Study of Small Business Controls," *N. A. C. A. Bulletin*, April 15, 1948, p. 1013.

variances have had on profits. A statement in this form enables the reader to determine how well costs have been kept in line with standards and when variances have occurred the principal causes for such variances are shown. Such statements may be the best method for bringing to top executives the comparison between standard and actual costs. The methods shown above also seem to follow from the view that manufacturing cost variances are not inventoriable costs.

Another plan of showing variances in the profit and loss statement incorporates them with the sales and cost of sales sections of the statement. This method of presentation follows the usual practice of charging manufacturing cost variances to cost of goods sold.[24] That the method of pricing followed may also be a consideration in determining the presentation of variances can be seen in the following comment received from one accountant interviewed in the field study:

> "If it is customary to take actual cost into consideration when the selling prices are quoted it would appear to me more logical to adjust the cost from standard to actual before comparing it with the selling prices. If, on the other hand, selling prices are based entirely on standard cost, it may be logical to apply the variance as an adjustment of gross profit."

The separate presentation of variances is of value principally to management and normally they are not shown separately from other costs in statements prepared for stockholders, creditors, and others not engaged in active management of the company.

When inventories are stated at actual cost, variances are viewed as part of the costs of manufacturing. Hence the portion of the variances which is related to goods which have been sold is logically added to standard cost of sales and the remainder is added to standard cost of inventories.

Adjustment of Inventories Costed at Standard Cost

Revision of Costing Standards

When the accounting plan uses standard costs for costing inventories and sales, it is desirable to review the standard costs

[24] The field study showed that in all but four cases variances are charged to cost of sales at the end of the year by companies costing inventories at standard cost.

periodically and to make changes in the costing standards when it is found that the standard costs in use are no longer proper ones for the purpose. The field study indicated that most companies review their standard costs annually, usually during the latter part of the fiscal year. Necessary changes in the standards which will be used for costing production during the coming period are made at this time.

This procedure may be contrasted with the need for more or less continuous revision of standards used for cost control. For the purpose of cost control, changes in product specifications or manufacturing methods which result in changes in operation time standards, material usage standards, or overhead budgets are commonly made during the year in order that these standards may serve as guides in day-by-day operation of the plant. However, for reasons of clerical economy, these interim changes are usually made only in the detailed operation standards and are not carried all the way through to the standard cost of the finished product until the end of the year when a complete revision of standard costs is made. When changes are made in some component details of the product cost standards without changing the latter standards, a variance will arise from the difference in charging goods into work in process at one standard cost and taking them out of work in process at another standard cost. These variances can be written off during the interim periods until a revised finished product cost standard is established.[25]

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[25] Practice in treatment of these variances from interim changes in standards differs according to the size and importance of the variances. One company which finds its variances from this cause to be small states that "We do not attempt to determine the variance, but simply allow the overages and shortages to accumulate in the inventory account, and adjustment is made at the end of the year at the same time that the books are adjusted to the physical inventory." Another company separates the amount of its labor variance due to changes in standards, describing its procedure as follows:

> "In order to determine the amount of the variance, the productive labor tickets are sorted to part number and operation number, and compared with the cost books. Differences are summarized departmentally in hours. Extension of these hours by the departmental standard labor rates determines the amount of labor variance from standard. In addition, these hours are used to adjust the time allowed hours at actual in order to convert them to standard for burden absorption purposes."

Another company prepares a complete monthly analysis of variances in which the amount of variance due to changes in control budgets is determined.

Changes in price and labor rates are sometimes handled by use of an inventory valuation account. The objective here is to bring the cost of the closing inventory into line with current conditions without adjusting the detailed underlying records.[26] However, the field study indicated that most companies make a complete revision of standard costs once a year. In the process, variances which resulted from changes in control standards without corresponding changes in costing standards are wiped out and standards used for the two purposes are brought into agreement.

Adjustment of Inventory to New Standard Costs

Changes in the standard costs raise the question of whether or not to adjust the closing inventory to reflect the changes that have been made in the standard costs. The answer to this question seems to depend upon the nature of the change that has been made in the standard costs.

1. If the new standard costs reflect conditions which affected the actual cost of the goods in the closing inventory, most companies adjust the inventory to the new standard cost and carry the contra side of the adjusting entry to cost of sales by way of the variance accounts. In effect, this procedure assumes that the standard costs used to cost goods in the inventory have been incorrect and that restatement of inventory cost is needed to bring inventories to a correct figure on the books. Since the use of incorrect standards has affected the variance accounts as well as the inventory, the adjustment is carried to the variance accounts.

2. If the standard costs represent conditions which are expected to prevail in the coming period but which have not affected costs in the past period, closing inventories are costed at the old standards. It appears to be common

[26] This method may be explained more specifically by assuming that a general increase in labor rates has taken place during the year. If standard costs have not been revised, the labor variance account will reflect this increase in wages paid. If desired, the amount of this variance applicable to inventory can be transferred to an inventory valuation account and the remainder of the variance charged to cost of sales since it is the amount of the increased labor cost applicable to goods which have been sold. On the books the inventory valuation account is used in order not to destroy the control relationship between inventory accounts and subsidiary records, but in preparing the balance sheet the valuation account is consolidated with the inventory.

practice to adjust the detailed inventory records to new standard costs before the end of the year just passed. In order to maintain the control relationship which the inventory accounts have over subsidiary records, the same adjustment is entered in the inventory control accounts and the contra entry is carried to an inventory valuation account. Thus the net effect is to state the inventory in the closing balance sheet at old standard cost. In the next period the inventory valuation account is closed to cost of sales when the goods to which the reserve relates move out of inventories. By use of this technique, the detailed records can be adjusted to new standards before the beginning of the year while at the same time the net charge to cost of sales in the new period is for old standard cost since the latter cost was correct at the time the goods were acquired.

Other Inventory Adjustments

Inventories which have been costed at standard cost are subject to the usual adjustments for obsolescence, physical condition, and realizable value. Most of the companies interviewed follow a policy of stating inventories at the lower of cost or market. In many cases any reduction of book costs to a lower market figure is accomplished in the process of adjusting inventories to revised standard costs. Thus a decrease in material price is reflected in the new standard cost at which the closing inventory is stated. However, if standard costs used in costing the closing inventory do not meet the requirements of lower of cost or market, an adjustment to reduce standard cost to market value can be made. In general, the use of standard costs for costing inventories would seem to offer no new problem in this respect, for the test of a comparison with market prices can be applied to standard costs as readily as it can be applied to actual costs.

Disclosure of Standard Cost as a Basis for Inventory Costing

When published financial statements disclose the fact that standard costs are used for costing inventories, the information is ordinarily given in connection with an explanation of the basis used for valuation of the inventories appearing in the balance sheet. Thus one company has appended to its balance sheet the following footnote:

"Raw materials and supplies were priced at the lower of actual cost or replacement market of specific items (on a first-in, first-out basis); in process at standard costs (approximate actual); finished goods at the lower of standard cost or replacement market."

In another case the balance sheet contains the following:

"Inventories priced at standard costs..... $xxx."

In the same report the auditor's certificate states that:

"Such quantities were priced, in accordance with the policy consistently followed by the company, at standard costs, which exclude certain overhead costs."

Conclusion

This study shows that standard costs are useful in accounting for production costs because they facilitate reduction of clerical expense by eliminating the need for carrying the many variations in actual costs through the inventory accounts. When standard costs are used in accounting, these fluctuations in cost are diverted to variance accounts, accumulated there, and disposed of in total.

With the above plan of accounting, production is costed at standard cost. A majority of the companies interviewed state their inventories at standard cost and charge the variances against income of the period in which the variances arise. They justify this practice on the grounds that variances represent inefficiency, avoidable waste not recoverable in selling price, and random fluctuations in actual cost. As such, these variances should be treated as period costs rather than as costs of goods in inventories. This reasoning seems to require standards which are current and attainable. Changes in external factors such as prices or changes in methods and performance efficiency which are made or accepted by management require revision of standards used in costing.

Standards which are not current still have value in reducing the clerical expense of bookkeeping for costs. However, in this case the general practice is to divide the variances between inventories and cost of goods sold or profit and loss thereby converting both inventories and cost of sales to approximate actual costs. In making this adjustment consideration is given to under- or overabsorption of overhead.

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